THE VETERINARY JOURNAL

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AUGUST, 1944

EDITORIAL

CLINICAL MEDICINE

In these days of advancing knowledge on problems of animal health and disease, based to a considerable extent upon the results of laboratory and, to a lesser extent, field research, publications in veterinary periodicals on clinical subjects are comparatively few. Whilst there is usually a small section devoted to clinical observations, the greater part is given over to articles of a different type. This arises largely from the failure of clinicians to put their observations on paper; undoubtedly the lack of the necessary time is one of the important causes. It is indeed regrettable that more of the careful and important observations of our experienced clinicians do not find their way into the literature. Much of our work in the field nowadays concerns the application of measures designed for the prevention of disease and the maintenance of health; nevertheless there is still, and must always be, need to treat the individual animal. The experiences of those who have had ample opportunity to carry out such practice are of far-reaching importance to the young, recently qualified, veterinary practitioner. We publish in this issue of The Veterinary Journal an article on bovine dystokia which deals with 97 consecutive cases met with in a veterinary practice. Articles such as this illustrate the great value in recording observations.

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General Articles

A STUDY OF 97 CONSECUTIVE CASES OF BOVINE DYSTOCIA AS THEY WERE ENCOUNTERED IN THE COURSE OF GENERAL PRACTICE

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Introduction

THE object of this article is to show the relative frequency with which various types of dystocia occur in the bovine species. The use of epidural anæsthesia and embryotomy will be discussed. A complete description of each case is given in the case records. The type of animal studied was exclusively the dairy cow, mainly of the Dairy Shorthorn and Guernsey breeds.

The main instruments carried to a parturition case were as follows :—

Hannover modification of Thygesen's Embryotome with Simon handles and wire.
Robert's embryotomy knife.
Gunther's finger knife.
Four tape snares.
Chain snares.
Pair of Blanchard's blunt and sharp crooks.
Keller's semi-sharp spatula.
Large amputation knife.
Hypodermic syringe with lumbar needles.
Obstetrical ointment, Dettol, pessaries and Parsetic anæsthetic.
Pulleys and rubber overall.

The instruments were sterilised after each case and kept in a clean condition. During an operation they were kept in a bucket of antiseptic solution. The embryotome was too large for this and was merely wiped over with a little Dettol before use. Another bucket was used for the operator's personal cleanliness. As the operation theatres varied from a ditch on a windswept hill, often in the rain, to a very dirty byre, the above methods appeared the only practical way of operating in a fairly clean manner. Absolute sterility or anything approaching it was impossible under the circumstances. However, of the 16 deaths recorded, only three cases could possibly be assigned to sepsis following parturition, and these may have been equally due to the dirty surroundings and improper attendance by the cowman.

Dystocia

This means difficult birth and may be classified as maternal, when due to some malformation in the maternal genital organs, or fœtal, when due to some deformity or malpresentation of the fœtus.

Maternal Dystocia

In the cases recorded, the following regions of the maternal organs were implicated: uterus, vagina, cervix and pelvis.

Uterus.—Torsion of the uterus was encountered in six cases. The degree of torsion varied from slight to marked in severity. The slight degrees of

torsion permitted the introduction of the hand into the uterus, the torsion appearing to be anterior to the cervix, which, however, was involved, in that it did not appear fully to dilate but to have an additional twist in it. The fœtus could be felt, and the limbs roped to assist in correcting the malformation. Two such cases were recorded and were corrected. In the marked torsion case, the vagina was thrown into a series of spiral folds and great difficulty was experienced in inserting the hand into it; the cervix could not be reached. Three such cases were thrown, rolled in the usual manner and the condition corrected. In these cases, vaginal examination controlled the direction and the amount of rolling. (Cases 2 and 93 were corrected without rolling, while Cases 10, 45 and 56 were corrected by rolling.) Case No. 46 could not be reduced after frequent rolling, and as the beast was in fat condition it was slaughtered for food. One case died as the result of a ruptured uterus caused by lay interference. One calf was delivered alive. In four cases the twist was to the right, whilst in the remaining two cases it was to the left. Five out of the six cases were heifers calving down with their first calf. The usual history of such a case was that the heifer had been straining for a considerable time but that nothing had occurred. There were usually symptoms of abdominal pain, in that the animal kicked at its belly and strained. Usually on the correction of this condition one could deliver the calf, but in one case the cervix had not dilated and 96 hours elapsed before delivery could be effected. In a severe case of torsion, laparotomy could be considered to correct the torsion if other methods failed and the beast warranted the expense.

Pelvis.—The only pelvic abnormality to be encountered was that of ill-development or immaturity leading to a small pelvic inlet. This narrowness gave difficulty to the passage of the shoulders and hips of a normal fœtus. When the fœtus was on the large size, a real difficulty was encountered which was very hard to overcome. There was little room to carry out embryotomy, which was exemplified in Case 61, where corrective manipulation alone was found to be very difficult. No case of a previously fractured pelvis was encountered. This type of narrow pelvis was seen in small, ill-fed, early-bred heifers; animals which had no right to be calving down at such an early age, i.e., 15 to 20 months, or in such poor condition. If they did not die, their usefulness as dairy cows was finished. In conclusion, pelvic obstructions did not cause a great deal of trouble in the cases under review.

Cervix.—The most common type of cervical dystocia encountered was what might be called a partially dilated cervix. This condition was encountered on four occasions, and every case was in a heifer. On one occasion the cervix dilated 58 hours after the onset of abdominal straining and a normal parturition occurred. This case should probably not be classed with the remaining three cases, where the cervix underwent partial dilatation but did not progress any further. This type of dystocia was found to be very serious, as forced traction usually resulted in cervical laceration to a greater or lesser degree. Although the procedure was to wait about 12 hours after the first examination to see if the cervix would dilate, interference would then have to commence as, due to loss of fœtal fluids, further delay would only complicate delivery. The method adopted was to dilate the cervix as much as possible manually and then apply

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forced traction with pulleys. These pulleys gave a steadier pull than manual labour. Cæsarian section would be the best procedure to adopt on such a case, but the difficulty lies in getting the permission of the owner, who, unless a cure can be promised, prefers to cut his loss and slaughter the beast for food.

A peculiar type of cervical obstruction was noted in Case 51. A smooth fibrous band was detected running from the roof of the vagina just anterior to the cervix to pass in front of it to the vaginal floor. It was very mobile and did not materially interfere with the normal course of parturition. A similar condition was noted on two other occasions.

Vagina.—Two types of abnormality were recorded, causing a definite barrier to parturition.

(1) A thickened ring, about 2 in. thick, which allowed the passage of two fingers, was detected in the hymenal region. Beyond this constriction the fœtus could be felt. This constriction was very tough, thick, and could not be broken down manually. Four cases were encountered, three of these being in heifers calving down for the first time, but one was in an old cow which had produced many calves. The procedure in this latter case was to incise the constriction dorsally and ventrally and apply forced traction. This animal died from sepsis four days later, although a live calf was delivered. In two cases forced traction was applied, and although this area of the vagina was lacerated the animals survived. One case, No. 26, was slaughtered, as the beast was uncontrollable and in beef condition. This type of dystocia is a serious hazard to the life of the fœtus and the parent, severe vaginal laceration and the death of the calf being the usual results. Cæsarian section would be the best surgical procedure in these cases.

(2) Small vagina and vulva. These genital organs were ill-developed, allowing only with difficulty the passage of the operator's hand. This condition was noted in two types of animals, the first type being the fat, well-fed Shorthorn heifer (Cases 90, 93 and 96). Here the vagina was small and lacerations occurred during delivery. Manipulation was difficult, there being little room to bring about head and limb corrections. The use of the embryotome was impossible. The second type was the thin, ill-nourished, immature heifer such as Case 18. This case died from sepsis following forced traction. Case 87 did not fall into the above categories, being a normal Guernsey heifer. The vagina alone appeared to be ill-developed. At first, only the hand as far as the wrist could be inserted into the vagina, but after much work the arm was passed in. It was impossible to effect any corrections, owing to the complete absence of any room. Cæsarian section was advised but, as usual, the owner preferred slaughter and compensation.

As will be seen from these above remarks, maternal dystocia was mainly associated with first calvers, 12 out of 14 cases affecting heifers. The death rate was high, five cases dying or being slaughtered, roughly 35 per cent. I feel however, that cæsarian section would have lowered the death rate and prevented severe injury to the cow.

Fœtal Dystocia

This was the most common type of dystocia encountered. It can be divided into three types :—

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(1) Abnormal presentation, position or posture of the fœtus.
(2) Gross oversize of the fœtus, which may or may not be accompanied by the above.
(3) Monstrosities.

Type One.—The various presentations are fully dealt with in the case records. The description of the positions are defined as per Benesch[1]. Presentation signifies the relation of the long axis of the fœtus to that of the mother. Position signifies to which surface of the uterus the fœtal vertebral column is applied. Posture means the position of the various individual movable parts of the fœtus.

Hand manipulation with snares with or without epidural anæsthesia was first attempted. It was found that Blanchard's blunt crook inserted into the inner canthus of a fœtal eye was an ideal instrument with which to correct a head deviation.

Great strength could be applied without damaging the eye, for the latter was protected by the third eyelid and the pressure was taken on the bony orbit. Embryotomy was always carried out under epidural anæsthesia if the parts to be amputated were inside the parent and not exposed at the vulva.

Type Two.—Gross oversize of the fœtus was always troublesome. Traction with plenty of lubrication was first tried in all cases. Total embryotomy was tried as a last resort. It was not always possible to carry out this operation properly, due to lack of room; also when traction was applied to a stump of the vertebral column, the tissues would tear out and the operator would find himself unable to remove, for instance, the retained forequarters or hindquarters of a divided fœtus. The cases encountered and the methods adopted are tabulated in the record report.

Type Three.—Eight cases of fœtal monster were recorded:—

Case 19. A schistocormus (VETERINARY JOURNAL, 1943). A bull calf having a patent umbilical ring of 4 in. in diameter. Through this opening there had passed part of the duodenum, omentum and abomasum. There was a complete absence on skin covering in this area.

Case 11. A calf with congenital shortening of the right foreleg flexor tendons leading to knuckling at the fetlock and knee joints with an enlarged fetlock joint.

Case 23. A calf with a short back and dorsal spinal curvature with a malformed twisted tail.

Case 49. A fœtus with generalised emphysema.

Case 62. Anasarcous fœtus.

Case 79. Anasarcous fœtus.

Case 85. A Schistosomud reflexus. This monster was presented with the uncovered bowels exposed at the vulva of the heifer. The monster was divided in half with the embryotome, and each half was delivered separately. The joints were all malformed and the liver was very large. It was a typical case. Two such identical monsters were also seen in this practice by our assistant, Mr. Sandercock. They were identical both in appearance and presentation to the one described above, and were delivered successfully. No examination of the fœtal membranes was carried out. A full description of this type of monster

is given by Williams[3]. He states that this monster has its origin in an abnormally developed vitelline tube, the apex of which becomes caught in the necrotic tip of chorion and fails to retract. This prevents the ventral folding of the somatopleure to form the body walls, restricts the formation of the amnion, and causes reflexion instead of ventral folding of the body walls. He made these observations from the study of complete fœtal membranes from such monsters.

Case 94. Anchylosis of the hip, stifle and hock joints in a breech presentation, with marked atrophy of the musculature.

There is no standard method or routine for these cases. The method of delivery adopted will vary according to the special requirements of the case. This is discussed in the case records.

Epidural Anæsthesia

This form of anæsthesia was found to be a great aid in selected cases. It greatly facilitated the correction of breech and hock flexion postures, both impacted and non-impacted. It was an essential aid to all large operations. The marked reduction in abdominal straining greatly facilitated manipulation of the embryotome. The site of injection was between the first and second coccygeal bones and the standard technique of injection was employed. The anæsthetic of choice was Parsetic (Parke Davis), a 2 per cent. solution. The dosage employed was as follows:—

Large breeds—Shorthorn, Friesian	13 c.c.s
Medium breeds—Guernsey, Ayrshire	11 c.c.s
Small breeds—Jersey, Kerry	9 c.c.s

With these dosages the animals remained standing, although straining was effectively controlled. Tail relaxation was almost immediate and straining ceased in about 10 minutes. The duration of anæsthesia lasted from three-quarters to one hour with little variation. The fact that the animal was able to stand was found to be a great advantage, for if the patient lay down the operation was always more difficult, less clean and very tiring. The above dosages were excellent and were employed on 23 occasions in the recorded cases without any ill-effects occurring at the time of injection or afterwards. The only disadvantage of epidural anæsthesia was that, once the necessary corrections had been made and traction applied, the subject was unable to help in delivery. Not only this, but the patient would stagger around the byre, although usually not going down, and this unsteadiness made traction difficult. Therefore, epidural anæsthesia was not employed unless it was felt that manipulative correction demanded it and was considered more important than the subsequent help at delivery which could be given by the animal if the anæsthetic had not been given.

On the whole, the anæsthesia was very useful, and saved many a tiring hour as well as sometimes the life of the calf. The relief of pain and the prevention of exhaustion and injury to the patient cannot be overrated.

Embryotomy

The Hannoverian modification of Thygesen's embryotome, with various finger knives, was used in these operations, which were usually carried out under epidural anæsthesia. This reduced the pain and risk of injury to the

patient and at the same time made the operation very much easier by the removal of voluntary straining.

Minor operations were completely successful, but total embryotomy was a definitely hazardous procedure. The space inside the vagina was often very limited; sometimes lack of fœtal fluids made matters worse. Mucilage was never available when required, and linseed oil was a hateful substitute. These factors usually prevented the operator cutting exactly where he would have wished, and in some cases the more anterior parts which were preventing delivery could not be reached for amputation. Sometimes when a fœtus had been divided through its trunk it was found to be very difficult, and in some cases impossible, to obtain a firm hold on the presented stump so as to remove the retained part. I have had ribs and spinal column tear out and still been unable to remove some retained fore or hindquarter. This was the hazard run when total embryotomy was employed. There was little danger of damage to the maternal genital organs; the danger lay in the probable failure to remove some or all of the remaining portion of the divided fœtus. Therefore in later cases total embryotomy was not undertaken until all other methods had failed and the gross oversize of the fœtus demanded it.

Embryotomy was employed in 21 cases; out of these three animals died. One case, No. 24, had been in labour five days and was dying of sepsis when first seen. In Case No. 32 lay interference had complicated matters, while in Case No. 76 there had again been lay interference, and although total embryotomy was started it could not be completed, owing to the failure to be able to apply the wire around the anterior portions of the impacted fœtus. Traction on the ribs and spinal column merely resulted in the tearing out of the tissues. The animal was slaughtered. Generally speaking, embryotomy was fairly successful.

Mummified calves were encountered on two occasions. In Case No. 67 calving was two months overdue, while in Case No. 72 it was six months overdue. The history was the same in each case. The date of parturition approached and passed without the animal showing any signs of calving. Then at a later date straining commenced, and on examination it was found that the cervix had opened and a fœtus was presented. In each case the fœtus had undergone maceration and was surrounded by a chocolate coloured discharge enclosed in its fœtal membranes. Both cases progressed satisfactorily.

There were two cases which were showing signs of milk fever. There was no straining, the cervix was fully dilated and the fœtal membranes were intact. Both animals were able to stand, but were unsteady on their feet. The line of treatment adopted in these cases was to deliver the calf and then treat the hypocalcæmia. This prevented straining commencing while operating, and both cases progressed satisfactorily.

Altogether there were six cases of abortion. They did not present any special difficulty, except that in some cases the vaginal passage was not properly dilated as at a normal parturition and sometimes the cervix did not fully dilate. Apart from these factors there was little special to note.

Conclusion

A review has been taken of 97 cases of parturition in the bovine as they were encountered in the course of general practice. There were 81 recoveries

with 24 live calves. This latter number is actually greater, as exact figures were not kept of these in the early stages. There were 12 sets of twins. The deaths were due to the following causes :—

From injuries due to lay interference	4
Deaths due to operative sepsis	3
Deaths due to sepsis from septic fœtuses ...	2
Slaughtered as inoperable	4
Died or were slaughtered—	
(a) Ruptured uterus	2
(b) Prolapsed uterus	1

After-treatment of this series of cases was very simple. A pessary was inserted immediately after calving and the attendant was instructed to insert *one* daily until the animal cleansed or was cleansed manually. The time and method of the removal of the after-birth varied according to the individual case. No set line of treatment was followed. The animal was kept in a clean box until she had cleansed and all discharge, if present, had ceased. These were the instructions given, although they were not always carried out.

In conclusion, the following observations are made. It is time that it was recognised generally that the treatment of dystocia in the bovine is not a simple procedure. It should be classed as a major operation, for it calls for a sound knowledge of anatomy, a high degree of surgical skill and considerable physical exertion. Each case should be attended with special care under the cleanest conditions possible. The care with which a parturition case is attended will influence the future breeding capacity of the patient to no small degree. The care and skill shown by the operator will elevate the position and status of his profession in the eyes of the public more than any degree or special diploma will do. Dirty, slovenly actions will do the reverse, in spite of holding degrees. The farmer should be taught not to interfere in a case where difficulty has been observed. Not only does he make the operator's task more difficult, but he may so seriously injure the cow that it has to be slaughtered, or rendered useless for further breeding. He should be taught to calve a cow down in clean, healthy surroundings, and not in the usual filthy conditions which seem to be the present practice. An enclosure of baled straw with a tarpaulin roof is sufficient if a clean loose box is not available. The ideal is to have a clean place where help can be given if required. It is hopeless attending a cow down in water meadows and up to her hocks in mud; it is not fair to the operator or the cow. It is felt that proper attendance to these points at calving would greatly lessen the parturition deaths, white scour in the newborn and the breeding troubles of the dairy cow. The resistance of the cow to a fatal infection and its ability to overcome an infection at calving is a constant source of wonder to me. This happy state of affairs, however, should not be abused.

Summary

(1) Ninety-seven cases of parturition in the bovine are listed and discussed, with 81 recoveries.
(2) The causes of the deaths are described.
(3) The exact fœtal dispositions are described in the records.

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(4) There were 12 sets of twins.

(5) The causes of dystocia are listed and discussed.

(6) The results of epidural anæsthesia and embryotomy are noted.

(7) Points to be noted at parturition are suggested.

(8) A list of instruments used is given.

REFERENCES

(1) Wright: *Benesch's Veterinary Obstetrics.*
(2) Tutt, J. B. (1943): *Vet. J., 99,* 244.
(3) Williams: "Diseases of the Genital Organs of Animals."

PARTURITION IN THE BOVINE

1 Shorthorn primiparous. Anterior presentation in the dorsal position with head deviation to the right. Manipulation. Live calf. Recovery.

2 Shorthorn primiparous. Anterior presentation in the left lateral position with head deviation to the left, lay interference had ruptured the right cornua as the uterus was slightly twisted to the right. Slaughtered.

3 Shorthorn multiparous. Anterior presentation in the dorsal position with bilateral elbow flexion. Manipulation. Live calf. Recovery.

4 Shorthorn multiparous. Dorso—transverse presentation with the head to the left (cow). Twins, the other in the normal posterior presentation from the left cornua. Total embryotomy of the first fœtus followed by delivery of the twin, under epidural anæsthesia. Recovery.

5 Guernsey multiparous. Anterior presentation in the dorsal position with slight bilateral elbow flexion. Manipulation. Live calf. Recovery.

6 Shorthorn primiparous. Posterior presentation in the dorsal position. Non-impacted bilateral hock flexion. Manipulation. Dead calf. Recovery.

7 Shorthorn multiparous. Posterior presentation in the dorso—slightly left lateral position with non-impacted bilateral hock flexion. Œdema of the fœtal membranes. Manipulation. Recovery.

8 Shorthorn heifer. Anterior presentation in the dorsal position with bilateral shoulder flexion and head exposed at the vulva. Fœtus large. Amputation of head and repulsion of stump, leg correction by manipulation. Recovery.

9 Shorthorn heifer. Normal anterior presentation but cervix only partially dilated. No improvement in 12 hours. Delivered by forced traction with vaginal tearing. Slaughtered three days later.

10 Shorthorn heifer. Twisted uterus to left. Anterior presentation in the dorsal position. Head deviated to the right. Legs able to be roped and drawn through the cervix to the mid-cannon region. Throwing and rolling to left and manipulation. Live calf. Recovery.

11 Guernsey cow. Lay interference. Anterior presentation in the dorsal position. Head and one leg exposed at vulva, right leg impacted, shoulder flexion. Congenital shortening of retained legs back tendons with knuckling at fetlock and knee joint and enlarged fetlock joint. Amputation of head and repulsion with manipulative correction of impacted leg. Recovery.

12 Shorthorn multiparous. Posterior presentation in the dorsal position with bilateral hock flexion, slightly impacted. Twin in identical position, without impaction, each in separate cornua. Bull had thrown three lots of twins in one year. Slight hypocalcæmia. Manipulation. Recovery.

(*To be continued*)

DOUBLE-CLOACA IN A CHICKEN

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Subject: A Rhode Island Red cross Light Sussex pullet hatched in March, 1943.

History: When about four weeks old this bird was observed to be abnormal, as its feathers around the abdomen were constantly soiled. Examination showed it to have two cloacæ, from the smaller of which was exuding a whitish liquid responsible for the condition of the feathers. At eight weeks of age, as the bird was being bullied by its neighbours, it was placed in a separate coop. Subsequently it behaved and grew normally, except that there was a slight twist along its back which gradually became more apparent. It was decided to retain the bird principally to observe what might happen if and when it came into production. At about six months old its comb and wattles reddened up and the bird appeared to be about to lay; but two months later, as it had failed to produce an egg, it was killed for examination.

Examination: The general appearance of the bird was good. There was a marked lateral curve in the vertebral column with the concavity towards the right. The tail was held erect with feathers outspread. This latter feature was probably compensatory to the curve in the spine and served to correct the balance.

An examination of the cloacal region revealed the normal cloaca, to the left of which and slightly below was a second cloaca. The two openings were 15 mm. apart and the diameter of the extra one was approximately half that of the normal. An effort was made to pass a probe up the extra cloaca, but it was found to end blindly after a very short course, the slightest pressure causing hæmorrhage. The single oviduct present opened on the dorso-lateral aspect of the extra cloaca; it was possible to pass a probe quite freely into its lumen.

It was noted that when the sphincter muscle of the cloaca acted there was a sympathetic contraction of the second cloaca.

Dissection Findings: The bodily condition was excellent and all visceral structures other than those associated with the uro-genital tract were normal. The true cloaca was continuous with the large intestine *via* the urodæum and coprodæum. There was no communication between the second cloaca and the intestinal tract; after a short course it ended blindly on the surface of the abdominal muscles, the urodæum and coprodæum being absent.

The oviduct led down from a normal quiescent ovary, its distal portion (the part corresponding to the mammalian uterus and in which the shell is usually formed) was dilated and attached by peritoneum to the terminal portion of the intestine, it quickly narrowed to open on the rim of the second cloaca as described. The two kidneys were normal: the right ureter opened into the urodæum, the left ureter joined the oviduct about 25 mm. from its termination. Thus all the fæces and the urine from the right kidney passed through the normal cloaca, while urine from the left kidney passed through the oviduct. The

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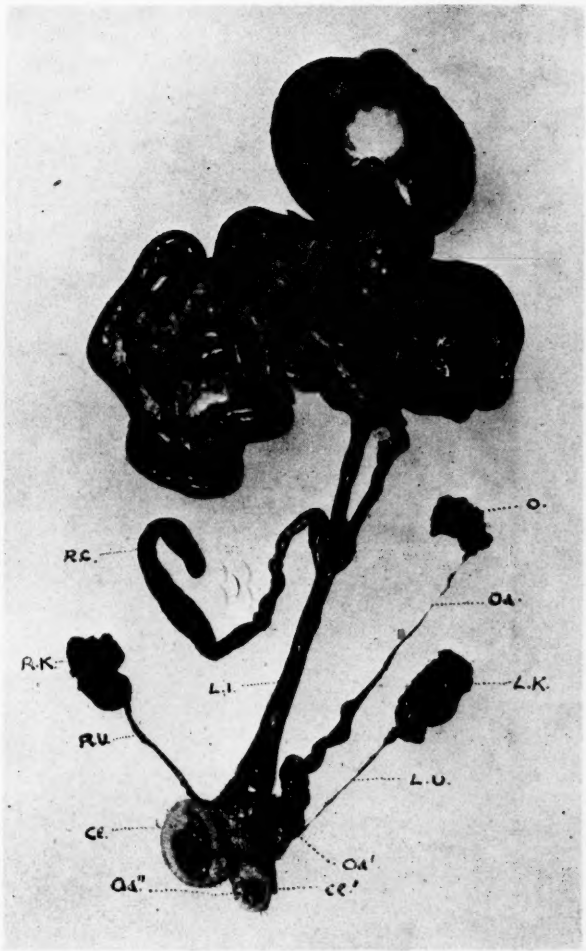

FIG. 1.—Ventral view of dissected viscera. O—ovary; Od—oviduct; Od'—dilated portion of oviduct; Od''—opening of oviduct; Cl—cloaca; Cl'—extra cloaca; L.K.—left kidney; L.U.—left ureter; R.K.—right kidney; R.U.—right ureter; L.I —large intestine; R.C.—right cæcal tube. (Note the left ureter opening into the oviduct. The extra cloaca was joined to the abdominal muscles at the level of the approximation of the oviduct with the intestine.)

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presence of dried creamy urine around the opening of the oviduct confirmed this latter point.

An examination of the vertebral column showed that the curve was due to the oblique nature of the articular ends of the vertebral bodies. The pelvic bones were also bent in their long axis and the coccygeal vertebræ were set more upright. It is not considered that these osteological features were in any way connected with the changes in the urogenital tract.

Discussion: As far as can be determined a case of this kind has not previously been reported. While this alone would appear to justify a record, it is also of interest in connection with poultry digestibility trials. Such trials are complicated by the fact that in birds the urine and fæces are excreted together through the cloaca. Surgical attempts to effect their separation, as for example by making an artificial exit for fæces, have been only partially successful, as the birds operated on do not regain normal health, and results so obtained are not trustworthy. In the case reported the urine from the left kidney was voided from the second cloaca unmixed with any fæcal material, and had this fact been recognised before the bird was slaughtered it would have been possible to collect a sample of urine, free from fæces, for chemical and other analysis. Such a bird would have been a good subject for digestibility trials, and should readers meet a similar case at any time they would render a valuable service by reporting it to the writers.

Abstracts

THE DEVELOPMENT OF ARTIFICIAL INSEMINATION IN THE U.S.A.*

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In the early '30's reports began arriving from Russia regarding their successes with the use of artificial insemination. Many of these reports came by way of Great Britain. They stimulated interest, and about this time studies pertaining to problems connected with artificial insemination were initiated at the Universites of Missouri and Minnesota. (Similar studies may have been started at other institutions.)

Early in the '30's, Howard Clapp, of the Pabst Farms, Oconomowoc, Wisconsin, and Dr. H. L. Kingman, of the Wyoming Hereford Ranch, Cheyenne, Wyoming, were making practical use of artificial insemination in their breeding operations.

In 1935 a conference of those interested in artificial insemination was held in connection with the meeting of the American Society of Animal Production. The meeting was well attended, and ten institutions reported having studies in progress or proposed that had a bearing on the problems of artificial insemination.

Sufficient progress had been made in the research at Minnesota so that in June, 1937, a small experimental breeding route was organised around the Agri-

* Paper No. 500, Miscellaneous Journal Series, Minnesota Agricultural Experiment Station.

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cultural Experiment Station at Grand Rapids, Minnesota. Prof. C. L. Cole, now of the Michigan Agricultural Experiment Station, carried out the work. With this unit it was definitely demonstrated that it was feasible to take semen from a central location to surrounding farms and settle cows. In May of 1938, Winters *et al.* published a bulletin entitled "Artificial Insemination of Farm Animals," in which methods of procedure were given.

In 1938, Prof. E. J. Perry, of the University of New Jersey, was instrumental in organising three co-operative artificial breeding groups in New Jersey. His organisations were very successful, and the practice grew and spread throughout the dairy centres of the United States.

Largely Confined to Dairy Cattle

Use of artificial insemination has been confined largely to dairy cattle. It is true, however, that it is being used on a very extensive scale by a few large organisations that are breeding beef cattle. On the whole, it appears that artificial insemination will remain confined very largely to dairy cattle in this country. Two important reasons are that dairy cattle are more likely to be concentrated than beef cattle, and the individual herds are more often small in numbers. Artificial insemination has more to offer the small herd owner than the large herd owner, because in natural mating the latter can spread sire cost over a larger number of females and thereby secure the use of superior sires.

Artificial insemination has been used successfully in sheep and swine, but it is not likely that its use will ever be extensive in other species. The reasons are that with sheep the added labour is more expensive than the direct services of a superior ram, and in swine the services of a boar can be spread over too few females to make it worth while. The techniques have never been developed to the same degree of perfection in horses that they have in cattle and sheep. In this country horses have decreased so markedly in numbers and economic importance that there has been little incentive to improve the techniques.

General Expansion

The first co-operative associations for artificial insemination were organised in 1938. Dowell and Winters (1942) made a survey of the "Economic Aspects of Artificial Insemination of Commercial Dairy Cows" and reported that whereas in the U.S.A. only about 5,000 cows were inseminated in 1938, by 1941 the estimated number was over 105,000. The practice has grown since 1941. No reliable figures are available for the country as a whole, but in Minnesota only about 10,000 cows were inseminated in 1941, and it is estimated that about 35,000 will be bred artificially in 1944.

Artificial insemination has aroused most interest in the areas where dairy cattle populations are quite dense (Dowell and Winters, 1942). This is true both as regards the interest of the practical farmer and of the scientists interested in problems of the dairy farmer.

General Methods of Organisation

The co-operative association has been the most popular type of service organisation. A few private organisations have, however, gone ahead, and several have had good results. It would appear that private enterprise might

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do very well for itself in this field. Private enterprise has the distinct advantage over the co-operative of having more definite direction, and an association for artificial insemination needs very definite direction if it is to function to best advantage.

Recently there appears to have developed considerable interest by individuals looking forward to developing this type of service as a private venture after the present war. I will not be surprised to see many pure-bred breeders offering this type of service following the war. It is also my opinion that many of these parties will give excellent service. They will have the advantages of one boss and of lower overhead costs.

The co-operative association has, however, to date proved the most successful and popular type of organisation. The true co-operative has the distinct advantage of arousing more interest among its patrons than any other type of organisation; it develops a feeling both of responsibility and of ownership. These, when properly developed, become great sources of strength.

Co-operatives of all sorts have been very popular with our dairymen; they have a record of excellent service to the dairy farmer. This record has no doubt had a marked influence on the spread of co-operative associations for artificial insemination. By and large, the most successful co-operative associations have been those that developed in the better and more concentrated dairy centres and that were developed to a large extent by the farmers themselves. This is not surprising, because they have the distinct advantages of being located in favourable environments both in respect to numbers of dairy cows and with respect to quality of farmer. In addition, such an organisation has more immediate support among its patrons.

We have had another type of farmer co-operative that in my opinion has been far less successful. This is the co-operative encouraged and subsidised by some governmental agency. These organisations have, for the most part, started under several distinct handicaps. The leadership has not always been thoroughly sound. In most instances they have been initiated in marginal territory in respect to both farming and dairying. For this reason, it was difficult to obtain enough cows within a given area to keep sire service costs low, and yet the patrons were not disposed to pay even average service charges, whereas the actual costs were above average. In several instances the governmental agency soon withdrew its subsidy, yet it had failed to provide in advance for this curtailment of financial assistance and it had failed to acquaint the prospective patrons of this expected curtailment at the time of organisation.

The above type of organisation started with divided responsibility which led to confusion and general dissatisfaction. Our experience is not to be construed as evidence that this type of organisation cannot succeed. It can, however, be taken as evidence that it is a difficult type of organisation to perfect. Those responsible for its organisation need to project their plans a considerable distance in the future. If the farmers are expected to eventually take over full responsibility, financial and direction, for the organisation, then provision toward that end needs to be made at the outset. What is more, the prospective patrons should be fully informed regarding these plans at the very outset. In several instances we have had associations for artificial insemination set up by

governmental agencies that did not know how long they themselves would remain in a position to assist in the work they were initiating. It is my opinion, based on considerable observation, that no governmental agency has the moral right to initiate a subsidised type of farmer co-operative unless it itself has reason to believe that it will remain in a position to carry the proposed programme to a successful point.

If the above precautions were taken, it appears that a governmental agency could be very useful in getting co-operative societies organised properly for artificial insemination.

Pitfalls

Like most other steps in progress, artificial insemination is no panacea and our work to date has demonstrated several possible pitfalls, the most common of which are discussed below :—

1.—Poor techniques. The use of poor techniques is always due to poor technicians. Artificial insemination is not a difficult technique, but there are almost endless wrong methods of procedure, and one wrong move is sufficient to spoil the results.

In many instances men have been put in the field without proper previous training and experience. A point well worth noting is the fact that it is not always the men with the most advanced academic training who have always made the best technicians. In fact, in some instances the men with advanced academic training knew "too much"; they were certain they could do things better than those who had taught them. The results were quite disastrous, especially for the farmers who wanted to have their cows settled.

A satisfactory technician for the routine work does not need to have advanced academic training, but he does need to possess precision, a willingness to follow directions, and good common sense. The above are pre-requisites and need to be topped off with a short period of intensive training in the techniques of insemination. Men so trained are satisfactory for the routine jobs connected with artificial insemination, but they need to be under the direction of someone with more technical skill and training. The latter individual needs to possess sufficient ability to follow the improvements in techniques and the ability to diagnose the complicated problems that will occasionally arise.

2.—Insufficient capital. Lack of working capital handicaps an organisation from the outset. It generally leads to paying salaries that are not sufficiently attractive to ensure the services of the better technicians. It also generally results in starting with too few bulls and with inadequate equipment; all of which leads to poor results in settling cows.

3.—Inadequate equipment. A small amount of equipment is absolutely essential to the success of a well organised association. A small laboratory that can be kept immaculately clean is a necessity. The laboratory needs to be provided with a sink, running water, hot water, a refrigerator and a microscope. In addition, the laboratory needs to be large enough to provide office space for the transaction of the association's business and for the filing of records—business and the details regarding inseminations.

4.—Records. Too many organisations have not realised the importance of careful detailed records until much valuable information was lost. Not only

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is it important to keep a complete record of all business of the association, but some details should be recorded regarding each sample of semen and each insemination. These details need to be recorded, and the method of recording needs to be worked out very carefully in advance; otherwise the record becomes a jumbled mess of data that no one can decipher properly.

The more important of these details are:—

(1) Identity of the bull from which the sample was taken.
(2) Identity of the man who gathered the sample.
(3) Date and hour sample was taken.
(4) Quantity of sample.
(5) Quality of sample—standard methods of measuring quality need to be adopted.
(6) Date and hour of use.
(7) Cows used on.
(8) Record of each cow's heat period.
(9) Name of inseminator.
(10) Recurrence or lack of recurrence of heat.

It is only through the use of complete records that troubles can be traced to their source.

5.—Aged bulls. Most associations were developed and promoted around proved sires. Proved sires are useful, but often they are too old to be able to perform heavy service. In some instances associations were started with no young bulls. This often led to trouble, because the old bulls did not produce either the quantity or the quality of semen required. It is generally well to use some young bulls that appear to possess promise rather than to depend entirely on proved sires.

6.—Proper care of bulls. Too often at the outset insufficient plans are made for the bulls' proper care. Most older bulls must be forced to take exercise, and this is best done with the so-called "merry-go-round" type of exerciser. It is much like the old-fashioned horse-power type of machine by which horses generated power for feed grinding, threshing, etc. Only in this case the power is supplied by a small electric motor and the bulls are led rather than they furnishing the power.

In addition, bulls require adequate rations; their feet need to be kept trimmed and their coats need to be kept clean.

Present Situation

At present the growth of artificial insemination is pretty much at a standstill. The chief reason is a lack of manpower. Thousands of farmers would gladly join an association, but military deferments have not always been granted to capable men in the field, and it is practically impossible to secure the proper type of man who could be trained for the work. The result is that we at the University of Minnesota have discouraged expansion of the programme for the duration of the war.

Expansion in the Future

It appears that when the war is over we will have a marked growth in the practice of artificial insemination. Interest has been so great among the better

farmers that this appears inevitable. In addition, while mistakes have been made, yet the overall record of our association is good; in fact it is very good. New associations should find it much easier to get started because they can profit by the experiences of those that have been under way. In addition, our educational centres are more likely to provide proper training for technicians than has been offered in the past.

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EXPERIMENTS WITH CRYSTAL VIOLET VACCINE FOR THE PREVENTION OF HOG CHOLERA*

By DR. C. G. COLE,

U.S. Bureau of Animal Industry, Swine Disease Experiment Station, Ames, Iowa

EXTENSIVE experiments aimed at development of a non-viable immunising agent against hog cholera have been carried out by the U.S.B.A.I. with crystal violet hog cholera vaccine, according to the method outlined and patented by the late Dr. Marion Dorset, of the Bureau.

Properly prepared vaccines have never produced cholera, either by extensive field tests or among unvaccinated control pigs used in test pens.

Like many other vaccines and bacterins containing killed or attenuated germs, crystal violet vaccine is slow acting. Between two and three weeks is required for immunity to develop after its administration. This renders use of vaccine impractical in cholera-sick herds, where garbage is fed or where there is danger of immediate exposure, for infection might occur before the immunity is completed.

Preparation

In production of crystal violet vaccine, the blood from each cholera-infected pig is cultured, prepared and incubated separately. Disease-producing properties of the blood are destroyed by additions of attenuating agents, including heat. Incubation experiments have demonstrated that the pathogenic properties of the blood are destroyed in from three to five days, although samples have been incubated as long as 31 days without affecting the potency, purity, or physical condition of the vaccine.

Production of defibrinated blood vaccine is a difficult procedure, and each phase of preparation from drawing the blood to finished bottling must be carried out with utmost precaution if the final product is to be potent and sterile.

Many failures in early investigational experiments were doubtless due to contamination of the vaccine. Some evidence has been obtained that contamination, even with non-pathogenic organisms, has destroyed the potency of the vaccine.

* *Iowa Veterinarian,* May-June, 1944.

Possible improvement in crystal violet vaccine production is probable through use of glycerol rather than disodium phosphate in the production process, according to the suggestions of Dr. Frank W. Tilley, Pathological Division, U.S.B.A.I.

Thirty-five lots of vaccine prepared by the crystal violet-glycerol process were found sterile at the end of the incubation period, while five of 35 batches prepared from the same blood by the crystal violet-disodium phosphate method showed contamination. Tests thus far indicate the glycerol product is fully as potent as the regular vaccine and field investigations to determine duration of immunity are now under way.

Safety and Purity

At the end of the incubation period each sublot is cultured and only sterile sublots are used in the final mixture.

Samples taken at the beginning, middle and end of the final bottling process are cultured and 1 c.c. of the final mixture is injected into two guinea pigs. In case the vaccine passes all these tests for purity it is then tested for safety and potency on susceptible pigs.

The safety test consists of injecting six susceptible pigs with vaccine in 3, 5 and 10 c.c. doses and placing three untreated control pigs from the same lot in the pen with the vaccine-treated pigs. If all nine pigs remain normal for three weeks the safety test is declared satisfactory.

The potency test consists of injecting the six pigs that receive vaccine and the three control pigs with hog cholera virus. If the six vaccine-treated pigs resist the virus injection and the three control pigs develop cholera and die, or are killed for virus, and show characteristic lesions of cholera, the vaccine is declared satisfactory for potency.

Intradermal Tests

In a few tests, 1 c.c. dozes of crystal violet vaccine have been administered to 26 pigs. Virus was injected three weeks later with the following results: twelve pigs remained normal, six showed slight reactions, six showed severe reactions, and two died.

Time Required to Develop Immunity

Experiments have shown that from two to three weeks is required for immunity to develop following vaccine treatment.

In three experiments, 72 pigs were used. Of these, 44 were given vaccine (5, 10 and 15 c.c.) and 28 were used as controls (no vaccine). Vaccinated and control pigs were exposed to hog cholera virus in 7, 10, 14 and 21 days after vaccination. All 28 of the control pigs developed cholera. Only one of the 44 vaccinated pigs died. Quite a number of the pigs exposed in less than three weeks showed severe reactions, but all exposed at twenty days remained normal.

This series of experiments shows quite definitely the vaccine affords some protection even at seven days. At the same time the severe reactions of some of the pigs that were exposed within three weeks following vaccination furnished evidence that protection against cholera should not be claimed until three weeks have elapsed after vaccine treatment.

Early experiments indicated the vaccine treatment was not satisfactory for

suckling pigs from immune sows. Because of this experience the vaccine is now recommended only for weaned pigs, preferably about ten weeks old.

Farm Experiments

In treatment of farm herds, every precaution is taken to prevent the introduction of disease at the time of treatment. Equipment and clothing are used which have not been in contact with hog cholera virus.

The vaccine is administered by subcutaneous injection on the inner side of the thigh. This method is preferred to injecton into the axillary space, as the sometimes irritating properties of the vaccine do not cause lameness or stiffness when injected subcutaneously into the inner groin surface.

Farmers are informed that vaccine probably will protect animals through the usual fattening period. Retreatment with vaccine within eight months is advised for animals to be kept for breeding stock.

In the vicinity of the Ames Station, 302 herds, containing 15,848 pigs, have been treated. The immediate results have been excellent. In only one of the 302 herds did sickness develop within one month after treatment. In this herd, sickness developed two weeks after treatment before immunity could be expected to be developed.

Immunity Tests

Through December, 1943, a total of 1,028 hogs from 264 herds, when ready for market, were tested with virulent hog cholera virus. Of these 95 per cent. survived and 5 per cent. died. It should be remembered that no comparable data on hogs vaccinated as pigs with serum and virus and tested with a dose of virulent virus are available.

During the last six months of 1943, 33 hogs from nine herds have been exposed. It was found that 90 per cent. of these were adequately protected, 10 per cent. showed severe reactions and recovered, and there were no deaths.

Problem Herds

Co-operating veterinarians in Iowa and other States, under Bureau supervision, have treated 398 so-called "problem herds," consisting of nearly 23,000 pigs.

Results have been satisfactory and only one "break" has been reported in the 398 herds treated. Many veterinarians and farmers report that sickness and deaths have been reduced immediately after vaccination by the use of the vaccine instead of serum and virus. Many of these herds, however, continue to be unsatisfactory, and the wisdom of selecting such herds exclusively for treatment with a new product is questionable.

Advantages and Disadvantages

The principal advantages of crystal violet vaccine in veterinary practice are that it does not cause a systemic reaction with consequent lowering of resistance, is not capable of causing disease or otherwise contributing to the spread of cholera, and is less expensive.

The principal disadvantages are slowness in development of immunity, and the duration of immunity is probably not as lasting as that produced by serum and virus.

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Abstracts of Current Literature

CROSS IMMUNITY BETWEEN EQUINE ENCEPHALOMYELITIS AND EQUINE INFECTIOUS ANÆMIA*

It has been stated that horses immunised against encephalomyelitis (western strain) have an increased resistance against infectious anæmia. Without claiming that such a relation exists, Mitchell and Walker of the Dominion of Canada Department of Agriculture, conducted experiments and tabulated results showing horses previously vaccinated against the western strain of encephalomyelitis were more resistant to experimental inoculations of the virus of infectious anæmia. The number of horses (nine) was regarded as too few to draw final conclusions.

In guinea pigs experimentally infected, no cross immunity could be demonstrated. All guinea pigs died.

* *Canadian Journal of Comparative Medicine,* May, 1943.

GAPEWORM (SYNGAMUS TRACHEA) INFECTION OF ADULT CHICKENS†

Although only young fowl are clinically affected with gapeworm disease, successful experimental infection of adult chickens indicates that grown-up birds may be carriers of causal nematode—*Syngamus trachea.* Oliver of the U.S. Department of Agriculture exposed 13 chickens to contaminated soil and found one of them gravely infected in 23 days. Symptoms of distressed breathing were pronounced and the autopsy revealed 94 pairs of the worm in the trachea. The fæces of the remaining 12 birds examined by the flotation method revealed that six were evacuating numerous worm eggs; and six were harbouring mature worms in the trachea. The observation appears to have proved that adult chickens are important factors in spreading the disease.

In a severe outbreak of gapeworm disease among young pheasants raised in confinement on a ranch in the State of Washington, barium antimonyl tartrate inhaled as a dust was found to be effective in the removal of the worms from the trachea, as was previously proved in chickens and turkeys.

† *Experiment Station Record,* February, 1944.

PATHOLOGY OF PREGNANCY DISEASE (TOXEMIA) OF EWES‡

Biochemical studies on the etiology of this fatal neurosis occurring in ewes during the last phase of pregnancy, made by Underwood and Shier in Western Australia, place the responsibility of the heavy drain on the maternal blood glucose in building up the adequate hepatic glycogen of fœtal life. Maternal glycemia and calcemia were ruled out as basic factors in this nervous upset by making biochemical determinations. By the same token the cause of the phenomenon was traced to low caloric intake of the ewe *vis-à-vis* the high demand of the fœtus for liver glycogen during late pregnancy. The finding accounts to a considerable extent for the high incidence of the disease in twin and triplet pregnancies. Maternal blood glucose and serum calcium were not sufficiently abnormal to account for the nervous catastrophe.

Prevention consisted in providing pregnant ewes with a ration capable of maintaining the metabolic equilibrium of mother and fœtus in respect to carbohydrate demands.

‡ *Australian Veterinary Journal,* December, 1943.

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WHOLE FISH DIET DESTROYS THIAMIN (VITAMIN B_1)*

Foxes fed a diet containing 20 per cent. of whole carp became victims of the fatal nervous disease known among American fox farmers as Chastex paralysis, but if foxes were fed that percentage of whole carp with 10 mg. of thiamin daily, they did not develop the disease. When the thiamin was reduced to 5 mg. daily, only a transient anorexia developed. Furthermore, the onset of Chastex paralysis was delayed one month in foxes receiving 2 mg. of thiamin daily. One group fed carp skins, scales, fins, heads and skeletons contracted the disease, as did also a group fed carp viscera, while groups fed carp muscles as fillets remained healthy. Further trials on fox farms showed that if foxes are fed whole fish several days per week and are given adequate amounts of vitamin B_1 the other days they do not develop the disease.

* *Experiment Station Record,* February, 1944.

Obituary

ARTHUR WILDMAN WHITEHOUSE, M.A.(Oxon), D.V.S.(Colorado), M.R.C.V.S.

Principal Whitehouse died on Tuesday, May 23, 1944. Although the passing of the years, ill-health and family bereavement had taken their toll, this doughty warrior died as he would have wished, in harness. In the history of the Glasgow Veterinary College two names will stand out for ever. McCall the builder and Whitehouse its champion who saved it from the hands of its zealous enemies.

Whitehouse was born in England and came of good yeoman stock. His father, William Whitehouse, was a surgeon who graduated from University College, London, and came from the West of England, where his family could be traced to early in 1600. On his mother's side, family history went back to the Lake family in the 14th century.

He went to a preparatory school at Stafford, and then to Winchester. In due course he proceeded to Oriel College, Oxford, but did not stay to take his degree. He went to America, then a land of adventure. It may be that this interruption of his academic career was due to the fact, it is said, that about that time he inherited some £70,000. What would most young men of spirit do in such circumstances? He purchased "The Oxford Horse Ranch" at Red Buttes, Wyoming. He was a man who never valued money for itself, and after a few years he had evidently spent most of his inheritance. When one asked him "How the ranch paid?" he would reply, with a slight American drawl, "Well, we had a lovely time, but made no money," and wished he could do it all over again. There is no doubt that his life at this time was full of incident, and he has been identified as the mystery rider of a pure white horse who used to give the inhabitants a thrill by galloping madly around the township. Life was not all a jest, however, for he conducted breeding experiments on his ranch, one of which was to produce polo ponies by the crossing of native ponies with thoroughbred stallions.

Whilst at the ranch he married. His wife was from New York, and in later years she became well known in this country to those who attended the annual N.V.M.A. congresses. During this Western period he attended the

ARTHUR WILDMAN WHITEHOUSE, M.A.(OXON),
D.V.S.(COLORADO), M.R.C.V.S.

Ontario State Veterinary College at Toronto, graduating in 1894. He went back to his ranch, but had to give it up, and started in practice at Laramie. Wyoming. He also lectured at the Wyoming College. Having now definitely decided on a veterinary career, he took the final year's course at the State College of Colorado and graduated D.V.S. (1912). After another spell of practice he was invited to return to the College as teacher of anatomy, and so he continued until the time of the Great War.

Whilst he was at Oxford he had been commissioned by Queen Victoria as Lieutenant in the Oxford Rifles. In 1897 he was gazetted Lieutenant in the National Guard of Colorado, his name being on the list at the first election, when he was described as having had experience as a soldier under Queen Victoria. The positions were allotted after examination, and Whitehouse found himself a gunner officer of the U.S.A. Army. He continued to take an active part, and when the Great War broke out he served with the American Forces in the Mexican Border War under General Pershing and received the State of Colorado campaign medal. Owing to the increasing needs of the Veterinary Department he was transferred to that service and served with distinction in France as a Captain.

When the war was over he returned to Oriel College, Oxford, took his B.A. in 1919 and proceeded to M.A. in 1922. In the latter year he took advantage of the post-war facilities of the R.C.V.S., entered at Liverpool Veterinary School and graduated M.R.C.V.S. on July 14, 1922. Almost immediately—indeed, he was first approached before he qualified M.R.C.V.S.—he was invited to become Director of Studies and succeed Professor Gaiger as Principal at the Glasgow Veterinary College. He accepted, and held the post until his death. This was a task which he took up with full zest; it was one after the heart of such a warrior.

He came to a College which was almost moribund and beset by jealous enemies who would leave no stone unturned to accelerate its demise. Opposition, and from within the profession, was determined and rules were not observed. Pressure and influence was brought to bear and the miserable yearly grant of £1,000 from the Government was stopped. Whitehouse appeared before authority to plead the claims of his College, and on his return was very distressed at the reception he and his colleagues had received. He must have been a man of the greatest courage to take over the management under such appalling conditions. He was determined to continue the fight. He appealed to public bodies, he addressed many schools as to the position of the profession, he encouraged young men to enter the profession, obtained some local financial help and rallied the best of Scotland in defence of the College. Encouraged by the number of students desirous of attending the school and with a view to the future, his governors were encouraged to send a deputation to view Continental schools, and as a result an architect was ordered to draw up plans for a new building. The College had entered upon a new era, there were 300 students and its existence was completely justified. His aspirations met with still further setback on the publication of the first Loveday report, which drove straight through his plans and would have made the College a Cinederella of others. He opposed the findings of this report with all his might, and in no uncertain measure.

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It was at this point that his friends observed a change in his bodily condition, but his will remained constant in the fight for the College. Frequently his bodily state was such that he was unable to stay full time at meetings. In spite of his preoccupation with the life of the Glasgow College, Whitehouse took an active interest in matters appertaining to the Government and politics of his profession. In 1926 he was elected to the Council of the R.C.V.S., and with one break of a year served until his death. He was elected President for the year 1940-41. He served on the Council of the N.V.M.A. and was an active member of the West of Scotland Division. Whilst at the Glasgow College he was also Professor of Anatomy and, as might be expected, he was unorthodox in his methods. He could inspire students and he always bore in mind the practical application of the subject. His wide knowledge of the world and of the veterinary field, coupled with a wealth of reminiscences, made him a most interesting lecturer who could make "dry bones live."

A man of medium height with eyes that twinkled with humour and a face which would break into a smile on the slightest provocation and betrayed a great kind heart, he won the esteem, respect and love of his students and staff. His interest in their welfare did not end with College days. He established a College employment bureau, and there are many who have to thank Whitehouse for their present positions. With the small means at his disposal he rearranged the plan of the old College, providing increased facilities for teaching and for the social side of College life.

He was a man who was never afraid to speak of what was in his mind and who feared neither friend nor foe. His views were always expressed in clear-cut language and very much to the point, yet they rarely gave offence, for there was always that touch of "Leacock" humour and kindness which turned away wrath. The death of his wife a few years ago was a great blow to him and left him a lonely old man, but he fought on and realised one of his greatest ambitions, to be the head of his profession, i.e., President of the R.C.V.S. Whitehouse has gone, but his spirit will live for ever in the Glasgow College, the spirit which will triumph over all adversity and make it worthy of the great city of the Clyde.

He was buried on Friday, May 26, 1944, at New Kilpatrick Cemetery, Hillfoot, Glasgow.

CORRECTIONS

Referring to the article by C. W. Ottaway, F.R.C.V.S., in the June issue, i.e., page 111, line 1, for "Casual" read "Causal."

July issue, page 151, second line from the bottom: for "Prescribe" read "Proscribe."

Publishers' Notices

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